

APPENDIX A-2.

**Reanalysis of Malignant Systemic Cancer and Serum Insulin
Inclusion of 174 Additional Dioxin Assays**

**Table A-2-1.
Comparison of Analyses for Malignant Systemic Neoplasms**

Model	Analysis	Cohort	Chapter 10 (Table 10-16)	Analysis with Additional Data (Table A-2-3)
			Relative Risk (p-Value)	Relative Risk (p-Value)
2	Unadjusted	RH: Current Dioxin > 10 ppt	0.63 (0.004)	0.62 (0.004)
	Adjusted	RH: Current Dioxin > 10 ppt	0.72 (0.073)	0.76 (0.139)
3	Unadjusted	Background RH (vs. Comparisons)	1.03 (0.914)	1.06 (0.832)
		Low RH (vs. Comparisons)	1.87 (0.024)	1.96 (0.013)
		High RH (vs. Comparisons)	0.67 (0.309)	0.68 (0.327)
		Low + High RH (vs. Comparisons)	1.26 (0.356)	1.30 (0.285)
	Adjusted	Background RH (vs. Comparisons)	0.94 (0.834)	0.96 (0.891)
		Low RH (vs. Comparisons)	1.72 (0.060)	1.78 (0.041)
		High RH (vs. Comparisons)	0.90 (0.801)	0.90 (0.783)
		Low + High RH (vs. Comparisons)	1.37 (0.220)	1.39 (0.183)
4	Unadjusted	All Ranch Hands w/ Current Dioxin	0.94 (0.585)	0.95 (0.599)
	Adjusted	All Ranch Hands w/ Current Dioxin	1.06 (0.537)	1.06 (0.620)
5	Unadjusted	All Ranch Hands w/ Current Dioxin	0.99 (0.872)	0.99 (0.899)
	Adjusted	All Ranch Hands w/ Current Dioxin	1.10 (0.359)	1.09 (0.411)
6	Unadjusted	All Ranch Hands w/ Current Dioxin	0.95 (0.585)	0.95 (0.604)
	Adjusted	All Ranch Hands w/ Current Dioxin	1.08 (0.506)	1.06 (0.606)

**Table A-2-2.
Comparison of Analyses for Serum Insulin (Continuous, Nondiabetics)**

Model	Analysis	Cohort	Chapter 18 (Table 18-40)	Analysis with Additional Data (Table A-2-5)
			Difference of Means or Slope (p-Value)	Difference of Means or Slope (p-Value)
2	Unadjusted	RH: Curr. Dioxin >10 ppt (Slope)	0.0639 (0.048)	0.0612 (0.058)
	Adjusted	RH: Curr. Dioxin >10 ppt (Slope)	0.0729 (0.035)	0.0726 (0.036)
3	Unadjusted	Background RH (vs. Comparisons)	-4.58 (0.170)	-3.86 (0.228)
		Low RH (vs. Comparisons)	-0.12 (0.977)	0.49 (0.905)
		High RH (vs. Comparisons)	7.48 (0.083)	6.70 (0.108)
		Low + High RH (vs. Comparisons)	3.61 (0.266)	3.61 (0.253)
	Adjusted	Background RH (vs. Comparisons)	-2.56 (0.365)	-2.46 (0.362)
		Low RH (vs. Comparisons)	-1.61 (0.631)	-1.81 (0.585)
		High RH (vs. Comparisons)	5.97 (0.104)	4.89 (0.168)
		Low + High RH (vs. Comparisons)	2.10 (0.437)	1.54 (0.558)
4	Unadjusted	All Ranch Hands w/ Curr. Dioxin (Slope)	0.1259 (<0.001)	0.1205 (<0.001)
	Adjusted	All Ranch Hands w/ Curr. Dioxin (Slope)	0.0529 (0.025)	0.0453 (0.048)
5	Unadjusted	All Ranch Hands w/ Curr. Dioxin (Slope)	0.1263 (<0.001)	0.1200 (<0.001)
	Adjusted	All Ranch Hands w/ Curr. Dioxin (Slope)	0.0646 (0.001)	0.0568 (0.003)
6	Unadjusted	All Ranch Hands w/ Curr. Dioxin (Slope)	0.0960 (<0.001)	0.0930 (<0.001)
	Adjusted	All Ranch Hands w/ Curr. Dioxin (Slope)	0.0351 (0.092)	0.0282 (0.160)

**Table A-2-3.
Analysis of Malignant Systemic Neoplasms**

a) MODEL 1: RANCH HANDS VS. COMPARISONS — UNADJUSTED					
Occupational Category	Group	n	Percent Yes	Est. Relative Risk (95% C.I.)	p-Value
<i>All</i>	<i>Ranch Hand</i>	<i>943</i>	<i>5.0</i>	<i>1.17 (0.78,1.74)</i>	<i>0.507</i>
	<i>Comparison</i>	<i>1,280</i>	<i>4.3</i>		
Officer	Ranch Hand	361	6.1	0.95 (0.54,1.67)	0.980
	Comparison	502	6.4		
Enlisted Flyer	Ranch Hand	160	8.1	1.54 (0.67,3.54)	0.414
	Comparison	203	5.4		
Enlisted Groundcrew	Ranch Hand	422	2.8	1.37 (0.61,3.09)	0.575
	Comparison	575	2.1		

b) MODEL 1: RANCH HANDS VS. COMPARISONS — ADJUSTED			
Occupational Category	Adj. Relative Risk (95% C.I.)	p-Value	Covariate Remarks^a
<i>All</i>	<i>1.16 (0.77,1.75)</i>	<i>0.479</i>	AGE (p<0.001) PACKYR (p=0.051)
Officer	0.94 (0.53,1.66)	0.820	
Enlisted Flyer	1.51 (0.65,3.52)	0.340	
Enlisted Groundcrew	1.37 (0.60,3.14)	0.454	

^a Covariates and associated p-values correspond to final model based on all participants with available data.

**Table A-2-3. (Continued)
Analysis of Malignant Systemic Neoplasms**

c) MODEL 2: RANCH HANDS -- INITIAL DIOXIN -- UNADJUSTED			
Initial Dioxin Category Summary Statistics			Analysis Results for Log₂ (Initial Dioxin)^a
Initial Dioxin	n	Percent Yes	Estimated Relative Risk (95% C.I.)^b
Low	171	7.0	0.62 (0.44,0.88)
Medium	176	8.0	
High	177	1.7	
			p-Value
			0.004

d) MODEL 2: RANCH HANDS -- INITIAL DIOXIN -- ADJUSTED			
Analysis Results for Log₂ (Initial Dioxin)^c			
n	Adj. Relative Risk (95% C.I.)^b	p-Value	Covariate Remarks
524	0.76 (0.52,1.11)**	0.139**	INIT*PACKYR (p=0.012) AGE (p<0.001) DC (p=0.143)

^a Adjusted for percent body fat at the time of duty in SEA and change in percent body fat from the time of duty in SEA to the date of the blood draw for dioxin.

^b Relative risk for a twofold increase in initial dioxin.

^c Adjusted for percent body fat at the time of duty in SEA, change in percent body fat from the time of duty in SEA to the date of the blood draw for dioxin, and covariates specified under "Covariate Remarks" column.

** Log₂ (initial dioxin)-by-covariate interaction (0.01 < p ≤ 0.05); adjusted relative risk, confidence interval, and p-value derived from a model fitted after deletion of this interaction; refer to Appendix Table A-2-4 for further analysis of this interaction.

Note: Low = 39-98 ppt; Medium = >98-232 ppt; High = >232 ppt.
INIT = Log₂ (initial dioxin).

**Table A-2-3. (Continued)
Analysis of Malignant Systemic Neoplasms**

e) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY — UNADJUSTED				
Dioxin Category	n	Percent Yes	Est. Relative Risk (95% C.I.)^{ab}	p-Value
Comparison	1,199	4.1		
Background RH	398	4.0	1.06 (0.60,1.91)	0.832
Low RH	256	8.2	1.96 (1.15,3.35)	0.013
High RH	268	3.0	0.68 (0.32,1.47)	0.327
Low plus High RH	524	5.5	1.30 (0.81,2.09)	0.285

f) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY — ADJUSTED				
Dioxin Category	n	Adj. Relative Risk (95% C.I.)^{ac}	p-Value	Covariate Remarks
Comparison	1,197			AGE (p<0.001) PACKYR (p=0.117)
Background RH	397	0.96 (0.53,1.74)	0.891	
Low RH	256	1.78 (1.02,3.09)	0.041	
High RH	268	0.90 (0.41,1.96)	0.783	
Low plus High RH	524	1.39 (0.85,2.28)	0.183	

^a Relative risk and confidence interval relative to Comparisons.

^b Adjusted for percent body fat at the time of duty in SEA and change in percent body fat from the time of duty in SEA to the date of the blood draw for dioxin.

^c Adjusted for percent body fat at the time of duty in SEA, change in percent body fat from the time of duty in SEA to the date of the blood draw for dioxin, and covariates specified under "Covariate Remarks" column.

Note: RH = Ranch Hand.

Comparison: Current Dioxin ≤ 10 ppt.

Background (Ranch Hand): Current Dioxin ≤ 10 ppt.

Low (Ranch Hand): Current Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 143 ppt.

High (Ranch Hand): Current Dioxin > 10 ppt, Initial Dioxin > 143 ppt.

**Table A-2-3. (Continued)
Analysis of Malignant Systemic Neoplasms**

g) MODELS 4, 5, AND 6: RANCH HANDS — CURRENT DIOXIN — UNADJUSTED					
Model ^a	Current Dioxin Category Percent Yes/(n)			Analysis Results for Log ₂ (Current Dioxin + 1)	
	Low	Medium	High	Est. Relative Risk (95% C.I.) ^b	p-Value
4	3.8 (317)	8.0 (299)	2.9 (306)	0.95 (0.77,1.16)	0.599
5	4.5 (314)	5.6 (302)	4.6 (306)	0.99 (0.83,1.18)	0.899
6 ^c	4.5 (313)	5.6 (302)	4.6 (306)	0.95 (0.79,1.15)	0.604

h) MODELS 4, 5, AND 6: RANCH HANDS — CURRENT DIOXIN — ADJUSTED				
Model ^a	n	Analysis Results for Log ₂ (Current Dioxin + 1)		
		Adj. Relative Risk (95% C.I.) ^b	p-Value	Covariate Remarks
4	921	1.06 (0.84,1.35)**	0.620**	CURR*DC (p=0.014) AGE (p<0.001) PACKYR (p=0.084)
5	921	1.09 (0.89,1.33)**	0.411**	CURR*PACKYR (p=0.037) CURR*DC (p=0.022) AGE (p<0.001)
6 ^d	920	1.06 (0.85,1.31)**	0.606**	CURR*PACKYR (p=0.036) CURR*DC (p=0.021) AGE (p<0.001)

^a Model 4: Log₂ (lipid-adjusted current dioxin + 1).
 Model 5: Log₂ (whole-weight current dioxin + 1).
 Model 6: Log₂ (whole-weight current dioxin + 1), adjusted for log₂ total lipids.

^b Relative risk for a twofold increase in current dioxin.

^c Adjusted for log₂ total lipids.

^d Adjusted for log₂ total lipids in addition to covariates specified under "Covariate Remarks" column.

** Log₂ (current dioxin + 1)-by-covariate interaction (0.01 < p ≤ 0.05); adjusted relative risk, confidence interval, and p-value derived from a model fitted after deletion of this interaction; refer to Appendix Table A-2-4 for further analysis of this interaction.

Note: Model 4: Low = ≤ 8.1 ppt; Medium = >8.1-20.5 ppt; High = >20.5 ppt.
 Models 5 and 6: Low = ≤ 46 ppq; Medium = >46-128 ppq; High = >128 ppq.
 CURR = Log₂ (current dioxin + 1).

Table A-2-4.
Interaction Table for Malignant Systemic Neoplasms

a) MODEL 2: RANCH HANDS — INITIAL DIOXIN — ADJUSTED (Initial Dioxin-by-Lifetime Cigarette Smoking History: Table A-2-3)					
Initial Dioxin Category Summary Statistics				Analysis Results for Log₂ (Initial Dioxin)	
Stratum	Initial Dioxin	n	Percent Yes	Adjusted Relative Risk (95% C.I.)^a	p-Value
0 pack-years	Low	45	8.9	0.29 (0.07,1.20)	0.088
	Medium	39	2.6		
	High	54	0.0		
>0-10 pack-years	Low	50	8.0	0.47 (0.18,1.22)	0.122
	Medium	45	2.2		
	High	69	1.5		
>10 pack-years	Low	76	5.3	1.04 (0.67,1.60)	0.864
	Medium	92	13.0		
	High	54	3.7		

b) MODEL 4: RANCH HANDS — CURRENT DIOXIN — ADJUSTED (Current Dioxin-by-Degreasing Chemical Exposure: Table A-2-3)					
Current Dioxin Category Summary Statistics				Analysis Results for Log₂ (Current Dioxin + 1)	
Stratum	Current Dioxin	n	Percent Yes	Adjusted Relative Risk (95% C.I.)^b	p-Value
No	Low	165	1.8	1.53 (1.07,2.19)	0.020
	Medium	112	11.6		
	High	65	4.6		
Yes	Low	151	6.0	0.84 (0.62,1.14)	0.270
	Medium	187	5.9		
	High	241	2.5		

Table A-2-4. (Continued)
Interaction Table for Malignant Systemic Neoplasms

c) MODEL 5: RANCH HANDS — CURRENT DIOXIN — ADJUSTED (Current Dioxin-by-Lifetime Cigarette Smoking History: Table A-2-3)					
Current Dioxin Category Summary Statistics				Analysis Results for Log₂ (Current Dioxin + 1)	
Stratum	Current Dioxin	n	Percent Yes	Adjusted Relative Risk (95% C.I.)^b	p-Value
0 pack-years	Low	89	4.5	0.81 (0.49,1.33)	0.399
	Medium	82	6.1		
	High	79	1.3		
>0-10 pack-years	Low	101	1.0	0.99 (0.61,1.62)	0.980
	Medium	79	6.3		
	High	105	1.0		
>10 pack-years	Low	124	7.3	1.20 (0.93,1.55)	0.171
	Medium	140	5.0		
	High	122	9.8		

d) MODEL 5: RANCH HANDS — CURRENT DIOXIN — ADJUSTED (Current Dioxin-by-Degreasing Chemical Exposure: Table A-2-3)					
Current Dioxin Category Summary Statistics				Analysis Results for Log₂ (Current Dioxin + 1)	
Stratum	Current Dioxin	n	Percent Yes	Adjusted Relative Risk (95% C.I.)^b	p-Value
No	Low	156	2.6	1.45 (1.05,1.99)	0.023
	Medium	120	7.5		
	High	66	9.1		
Yes	Low	158	6.3	0.92 (0.72,1.18)	0.496
	Medium	181	4.4		
	High	240	3.3		

Table A-2-4. (Continued)
Interaction Table for Malignant Systemic Neoplasms

e) MODEL 6: RANCH HANDS — CURRENT DIOXIN — ADJUSTED (Current Dioxin-by-Lifetime Cigarette Smoking History: Table A-2-3)					
Current Dioxin Category Summary Statistics				Analysis Results for Log₂ (Current Dioxin + 1)	
Stratum	Current Dioxin	n	Percent Yes	Adjusted Relative Risk (95% C.I.)^b	p-Value
0 pack-years	Low	89	4.5	0.79 (0.48,1.32)	0.371
	Medium	82	6.1		
	High	79	1.3		
>0-10 pack-years	Low	101	1.0	0.98 (0.60,1.60)	0.938
	Medium	79	6.3		
	High	105	1.0		
> 10 pack-years	Low	123	7.3	1.17 (0.88,1.54)	0.276
	Medium	140	5.0		
	High	122	9.8		

f) MODEL 6: RANCH HANDS — CURRENT DIOXIN — ADJUSTED (Current Dioxin-by-Degreasing Chemical Exposure: Table A-2-3)					
Current Dioxin Category Summary Statistics				Analysis Results for Log₂ (Current Dioxin + 1)	
Stratum	Current Dioxin	n	Percent Yes	Adjusted Relative Risk (95% C.I.)^b	p-Value
No	Low	156	2.6	1.41 (1.01,1.96)	0.042
	Medium	120	7.5		
	High	66	9.1		
Yes	Low	157	6.4	0.89 (0.68,1.16)	0.390
	Medium	181	4.4		
	High	240	3.3		

^a Relative risk for a twofold increase in initial dioxin.

^b Relative risk for a twofold increase in current dioxin.

Note: Model 2: Low = 39-98 ppt; Medium = > 98-232 ppt; High = > 232 ppt.
 Model 4: Low = ≤ 8.1 ppt; Medium = > 8.1-20.5 ppt; High = > 20.5 ppt.
 Models 5 and 6: Low = ≤ 46 ppq; Medium = > 46-128 ppq; High = > 128 ppq.

**Table A-2-5.
Analysis of Serum Insulin (mIU/ml) (Nondiabetics)
(Continuous)**

a) MODEL 1: RANCH HANDS VS. COMPARISONS — UNADJUSTED						
Occupational Category	Group	n	Mean^{ab}	Difference of Means (95% C.I.)^c	p-Value^d	
<i>All</i>	<i>Ranch Hand</i>	<i>808</i>	<i>73.88</i>	<i>-0.29 --</i>	<i>0.923</i>	
	<i>Comparison</i>	<i>1,098</i>	<i>74.17</i>			
Officer	Ranch Hand	310	69.90	3.83 --	0.374	
	Comparison	444	66.07			
Enlisted Flyer	Ranch Hand	137	75.63	-9.64 --	0.225	
	Comparison	166	85.27			
Enlisted Groundcrew	Ranch Hand	361	74.29	-1.70 --	0.703	
	Comparison	488	75.99			

b) MODEL 1: RANCH HANDS VS. COMPARISONS — ADJUSTED						
Occupational Category	Group	n	Adj. Mean^{ab}	Difference of Adj. Means (95% C.I.)^c	p-Value^d	Covariate Remarks^e
<i>All</i>	<i>Ranch Hand</i>	<i>794</i>	<i>58.55**</i>	<i>-0.08 -- **</i>	<i>0.968**</i>	GROUP*BFAT (p=0.017)
	<i>Comparison</i>	<i>1,081</i>	<i>58.64**</i>			
Officer	Ranch Hand	306	64.42**	2.61 -- **	0.463**	AGE (p<0.001) FAST (p=0.597) RACE*OCC (p=0.024)
	Comparison	441	61.81**			
Enlisted Flyer	Ranch Hand	134	48.88**	7.34 -- **	0.113**	RACE*PERS (p=0.029)
	Comparison	163	56.22**			
Enlisted Groundcrew	Ranch Hand	354	60.47**	0.65 -- **	0.839**	PERS*FAMDIAB (p=0.037)
	Comparison	477	59.82**			

^a Transformed from the natural logarithm scale.

^b Adjusted for fasting status.

^c Difference of means after transformation to original scale; confidence interval on difference of means not presented because analysis was performed on natural logarithm scale.

^d P-values based on difference of means on natural logarithm scale.

^e Covariates and associated p-values correspond to final model based on all participants with available data.

** Group-by-covariate interaction (0.01 < p ≤ 0.05); adjusted mean, difference of adjusted means, and p-value derived from a model fitted after deletion of this interaction; refer to Appendix Table A-2-6 for further analysis of this interaction.

Table A-2-5. (Continued)
Analysis of Serum Insulin (mIU/ml) (Nondiabetics)
(Continuous)

c) MODEL 2: RANCH HANDS -- INITIAL DIOXIN -- UNADJUSTED						
Initial Dioxin Category Summary Statistics				Analysis Results for Log₂ (Initial Dioxin)^b		
Initial Dioxin	n	Mean^a	Adj. Mean^{ab}	R²	Slope (Std. Error)^c	p-Value
Low	143	70.29	72.62	0.119	0.0612 (0.0321)	0.058
Medium	145	73.47	75.33			
High	143	86.39	81.53			

d) MODEL 2: RANCH HANDS -- INITIAL DIOXIN -- ADJUSTED						
Initial Dioxin Category Summary Statistics			Analysis Results for Log₂ (Initial Dioxin)^d			
Initial Dioxin	n	Adj. Mean^{ad}	R²	Adj. Slope (Std. Error)^c	p-Value	Covariate Remarks
Low	143	66.87	0.270	0.0726 (0.0344)	0.036	AGE*BFAT (p=0.010) BFAT*OCC (p=0.038)
Medium	145	72.41				
High	143	81.54				

^a Transformed from natural logarithm scale.

^b Adjusted for percent body fat at the time of duty in SEA and change in percent body fat from the time of duty in SEA to the date of the blood draw for dioxin.

^c Slope and standard error based on natural logarithm of serum insulin versus log₂ (initial dioxin).

^d Adjusted for percent body fat at the time of duty in SEA, change in percent body fat from the time of duty in SEA to the date of the blood draw for dioxin, and covariates specified under "Covariate Remarks" column.

Note: Low = 39-98 ppt; Medium = >98-232 ppt; High = >232 ppt.

Table A-2-5. (Continued)
Analysis of Serum Insulin (mIU/ml) (Nondiabetics)
(Continuous)

e) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY — UNADJUSTED					
Dioxin Category	n	Mean^{ab}	Adj. Mean^{ac}	Difference of Adj. Mean vs. Comparisons (95% C.I.)^d	p-Value^e
Comparison	1,031	76.85	66.88		
Background RH	357	66.69	63.02	-3.86 --	0.228
Low RH	210	79.17	67.37	0.49 --	0.905
High RH	221	92.92	73.58	6.70 --	0.108
Low plus High RH	431	86.22	70.49	3.61 --	0.253

f) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY — ADJUSTED					
Dioxin Category	n	Adj. Mean^{af}	Difference of Adj. Mean vs. Comparisons (95% C.I.)^d	p-Value^e	Covariate Remarks
Comparison	1,014	58.10**			DXCAT*AGE (p=0.037) FAST (p=0.417)
Background RH	354	55.64**	-2.46 -- **	0.362**	RACE*OCC (p=0.007)
Low RH	204	56.29**	-1.81 -- **	0.585**	OCC*PERS (p=0.015)
High RH	216	62.99**	4.89 -- **	0.168**	PERS*FAMDIAB (p=0.045)
Low plus High RH	420	59.64**	1.54 -- **	0.558**	

^a Transformed from natural logarithm scale.

^b Adjusted for fasting status.

^c Adjusted for fasting status, percent body fat at the time of duty in SEA and change in percent body fat from the time of duty in SEA to the date of the blood draw for dioxin.

^d Difference of adjusted means after transformation to original scale; confidence interval on difference of adjusted means not presented because analysis was performed on natural logarithm scale.

^e P-value is based on difference of means on natural logarithm scale.

^f Adjusted for percent body fat at the time of duty in SEA, change in percent body fat from the time of duty in SEA to the date of the blood draw for dioxin, and covariates specified under "Covariate Remarks" column.

** Categorized dioxin-by-covariate interaction ($0.01 < p \leq 0.05$); adjusted mean, difference of adjusted means, and p-value derived from a model fitted after deletion of this interaction; refer to Appendix Table A-2-6 for further analysis of this interaction.

Note: RH = Ranch Hand.

Comparison: Current Dioxin \leq 10 ppt.

Background (Ranch Hand): Current Dioxin \leq 10 ppt.

Low (Ranch Hand): Current Dioxin $>$ 10 ppt, 10 ppt $<$ Initial Dioxin \leq 143 ppt.

High (Ranch Hand): Current Dioxin $>$ 10 ppt, Initial Dioxin $>$ 143 ppt.

DXCAT = Categorized Dioxin.

Table A-2-5. (Continued)
Analysis of Serum Insulin (mIU/ml) (Nondiabetics)
(Continuous)

g) MODELS 4, 5, AND 6: RANCH HANDS — CURRENT DIOXIN — UNADJUSTED						
Model^c	Current Dioxin Category Mean^{ab}/(n)			Analysis Results for Log₂ (Current Dioxin + 1)		
	Low	Medium	High	R²	Slope (Std. Error)^d	p-Value
4	36.33 (290)	43.66 (246)	52.10 (252)	0.041	0.1205 (0.0213)	<0.001
5	35.89 (290)	44.27 (251)	54.34 (247)	0.054	0.1200 (0.0183)	<0.001
6 ^e	38.00 (289)	44.48 (251)	51.31 (247)	0.081	0.0930 (0.0191)	<0.001

h) MODELS 4, 5, AND 6: RANCH HANDS — CURRENT DIOXIN — ADJUSTED							
Model^c	Current Dioxin Category Adjusted Mean^b/(n)			Analysis Results for Log₂ (Current Dioxin + 1)			
	Low	Medium	High	R²	Adj. Slope (Std. Error)^d	p-Value	Covariate Remarks
4	34.67 (287)	34.31 (241)	40.12 (246)	0.272	0.0453 (0.0228)	0.048	AGE (p<0.001) PERS (p=0.122) BFAT (p<0.001) FAST (p=0.108) OCC*FAMDIAB (p=0.010)
5	34.41 (288)	35.33 (245)	41.66 (241)	0.277	0.0568 (0.0194)	0.003	AGE (p<0.001) PERS (p=0.120) BFAT (p<0.001) FAST (p=0.120) OCC*FAMDIAB (p=0.010)
6 ^f	36.41 (287)	35.63 (245)	39.18 (241)	0.312	0.0282 (0.0201)	0.160	AGE (p<0.001) PERS (p=0.044) BFAT (p<0.001) FAST (p=0.123) OCC*FAMDIAB (p=0.010)

^a Transformed from natural logarithm scale.

^b Adjusted for fasting status.

^c Model 4: Log₂ (lipid-adjusted current dioxin + 1).
 Model 5: Log₂ (whole-weight current dioxin + 1).
 Model 6: Log₂ (whole-weight current dioxin + 1), adjusted for log₂ total lipids.

^d Slope and standard error based on natural logarithm of serum insulin versus log₂ (current dioxin + 1).

^e Adjusted for log₂ total lipids.

^f Adjusted for log₂ total lipids in addition to covariates specified under "Covariate Remarks" column.

Note: Model 4: Low = ≤ 8.1 ppt; Medium = >8.1-20.5 ppt; High = >20.5 ppt.
 Models 5 and 6: Low = ≤ 46 ppq; Medium = >46-128 ppq; High = >128 ppq.

Table A-2-6.
Interaction Table for Serum Insulin (mIU/ml) (Nondiabetics)
(Continuous)

a) MODEL 1: RANCH HANDS VS. COMPARISONS — ADJUSTED (Group-by-Body Fat: Table A-2-5)							
Stratum	Occupational Category	Group	n	Adjusted Mean^a	Difference of Adjusted Means (95% C.I.)^b	p-Value^c	
<i>Obese: >25%</i>	<i>All</i>	<i>Ranch Hand</i>	<i>175</i>	<i>117.03</i>	<i>17.32 --</i>	<i>0.043</i>	
		<i>Comparison</i>	<i>243</i>	<i>99.71</i>			
<i>Lean or Normal: ≤25%</i>	<i>All</i>	<i>Ranch Hand</i>	<i>619</i>	<i>55.96</i>	<i>-3.19 --</i>	<i>0.189</i>	
		<i>Comparison</i>	<i>838</i>	<i>59.15</i>			
<i>Obese: >25%</i>	<i>Officer</i>	<i>Ranch Hand</i>	<i>59</i>	<i>135.02</i>	<i>29.48 --</i>	<i>0.066</i>	
		<i>Comparison</i>	<i>89</i>	<i>105.54</i>			
	<i>Enlisted Flyer</i>	<i>Ranch Hand</i>	<i>28</i>	<i>105.19</i>	<i>16.27 --</i>	<i>0.400</i>	
		<i>Comparison</i>	<i>37</i>	<i>88.92</i>			
	<i>Enlisted Groundcrew</i>	<i>Ranch Hand</i>	<i>88</i>	<i>115.32</i>	<i>10.63 --</i>	<i>0.390</i>	
		<i>Comparison</i>	<i>117</i>	<i>104.69</i>			
	<i>Lean or Normal: ≤25%</i>	<i>Officer</i>	<i>Ranch Hand</i>	<i>247</i>	<i>63.64</i>	<i>0.67 --</i>	<i>0.874</i>
			<i>Comparison</i>	<i>352</i>	<i>62.98</i>		
		<i>Enlisted Flyer</i>	<i>Ranch Hand</i>	<i>106</i>	<i>43.22</i>	<i>-10.82 --</i>	<i>0.033</i>
<i>Comparison</i>			<i>126</i>	<i>54.03</i>			
<i>Enlisted Groundcrew</i>		<i>Ranch Hand</i>	<i>266</i>	<i>58.34</i>	<i>-3.24 --</i>	<i>0.400</i>	
		<i>Comparison</i>	<i>360</i>	<i>61.58</i>			

Table A-2-6. (Continued)
Interaction Table for Serum Insulin (mIU/ml) (Nondiabetics)
(Continuous)

b) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY -- ADJUSTED (Dioxin Category-by-Age: Table A-2-5)					
Stratum	Dioxin Category	n	Adjusted Mean ^a	Difference of Adjusted Mean vs. Comparisons (95% C.I.) ^b	p-Value ^c
Born ≥1942	Comparison	467	47.57		
	Background RH	133	42.00	-5.57 --	0.099
	Low RH	80	45.54	-2.03 --	0.636
	High RH	136	49.83	2.26 --	0.535
	Low plus High RH	216	48.20	0.63 --	0.834
Born <1942	Comparison	547	64.30		
	Background RH	221	64.36	0.06 --	0.989
	Low RH	124	63.31	-0.99 --	0.837
	High RH	80	71.96	7.66 --	0.227
	Low plus High RH	204	66.57	2.27 --	0.583

^a Transformed from natural logarithm scale.

^b Difference of means after transformation to original scale; confidence interval on difference of means not presented because analysis was performed on natural logarithm scale.

^c P-value is based on difference of means on natural logarithm scale.

Note: RH = Ranch Hand.

Comparison: Current Dioxin ≤ 10 ppt.

Background (Ranch Hand): Current Dioxin ≤ 10 ppt.

Low (Ranch Hand): Current Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 143 ppt.

High (Ranch Hand): Current Dioxin > 10 ppt, Initial Dioxin > 143 ppt.

Table A-2-7.
Analysis of Serum Insulin (mIU/ml) (Nondiabetics)
(Continuous)
Occupation and Body Fat Removed from Final Model

a) MODEL 2: RANCH HANDS — INITIAL DIOXIN — ADJUSTED						
Initial Dioxin Category Summary Statistics			Analysis Results for Log ₂ (Initial Dioxin) ^b			
Initial Dioxin	n	Adj. Mean ^{ab}	R ²	Adj. Slope (Std. Error) ^c	p-Value	Covariate Remarks
Low	143	69.02	0.154	0.0969 (0.0327)	0.003	AGE (p < 0.001)
Medium	145	74.34				
High	143	86.93				

^a Transformed from natural logarithm scale.

^b Adjusted for percent body fat at the time of duty in SEA, change in percent body fat from the time of duty in SEA to the date of the blood draw for dioxin, and covariates specified under "Covariate Remarks" column.

^c Slope and standard error based on natural logarithm of serum insulin versus log₂ (initial dioxin).

Note: Low = 39-98 ppt; Medium = >98-232 ppt; High = >232 ppt.

Table A-2-7. (Continued)
Analysis of Serum Insulin (mIU/ml) (Nondiabetics)
(Continuous)
Occupation and Body Fat Removed from Final Model

b) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY — ADJUSTED					
Dioxin Category	n	Adj. Mean^{ab}	Difference of Adj. Mean vs. Comparisons (95% C.I.)^c	p-Value^d	Covariate Remarks
Comparison	1,014	66.71**			DXCAT*AGE (p=0.037) RACE (p=0.833) FAST (p=0.869) PERS*FAMDIAB (p=0.107)
Background RH	354	61.62**	-5.09 -- **	0.103**	
Low RH	204	66.98**	0.27 -- **	0.946**	
High RH	216	76.42**	9.71 -- **	0.022**	
Low plus High RH	420	71.68**	4.97 -- **	0.115**	

^a Transformed from natural logarithm scale.

^b Adjusted for percent body fat at the time of duty in SEA, change in percent body fat from the time of duty in SEA to the date of the blood draw for dioxin, and covariates specified under "Covariate Remarks" column.

^c Difference of adjusted means after transformation to original scale; confidence interval on difference of adjusted means not presented because analysis was performed on natural logarithm scale.

^d P-value is based on difference of means on natural logarithm scale.

** Categorized dioxin-by-covariate interaction ($0.01 < p \leq 0.05$); adjusted mean, difference of adjusted means, confidence interval, and p-value derived from a model fitted after deletion of this interaction; refer to Appendix Table A-2-8 for further analysis of this interaction.

Note: RH = Ranch Hand.

Comparison: Current Dioxin \leq 10 ppt.

Background (Ranch Hand): Current Dioxin \leq 10 ppt.

Low (Ranch Hand): Current Dioxin $>$ 10 ppt, 10 ppt $<$ Initial Dioxin \leq 143 ppt.

High (Ranch Hand): Current Dioxin $>$ 10 ppt, Initial Dioxin $>$ 143 ppt.

Table A-2-7. (Continued)
Analysis of Serum Insulin (mIU/ml) (Nondiabetics)
(Continuous)
Occupation and Body Fat Removed from Final Model

c) MODELS 4, 5, AND 6: RANCH HANDS — CURRENT DIOXIN — ADJUSTED							
Model ^b	Current Dioxin Category Adjusted Mean ^a /(n)			Analysis Results for Log ₂ (Current Dioxin + 1)			
	Low	Medium	High	R ²	Adj. Slope (Std. Error) ^c	p-Value	Covariate Remarks
4	34.57 (287)	41.39 (241)	54.38 (246)	0.095	0.1485 (0.0215)	<0.001	AGE (p<0.001) FAMDIAB (p=0.489) PERS (p=0.389) FAST (p=0.249)
5	34.26 (288)	41.22 (245)	56.41 (241)	0.107	0.1402 (0.0183)	<0.001	AGE (p<0.001) FAMDIAB (p=0.526) PERS (p=0.352) FAST (p=0.256)
6 ^d	36.18 (287)	42.65 (245)	53.62 (241)	0.126	0.1158 (0.0192)	<0.001	AGE (p<0.001) FAMDIAB (p=0.576) PERS (p=0.201) FAST (p=0.263)

^a Transformed from natural logarithm scale.

^b Model 4: Log₂ (lipid-adjusted current dioxin + 1).

Model 5: Log₂ (whole-weight current dioxin + 1).

Model 6: Log₂ (whole-weight current dioxin + 1), adjusted for log₂ total lipids.

^c Slope and standard error based on natural logarithm of serum insulin versus log₂ (current dioxin + 1).

^d Adjusted for log₂ total lipids in addition to covariates specified under "Covariate Remarks" column.

Note: Model 4: Low = ≤ 8.1 ppt; Medium = >8.1-20.5 ppt; High = >20.5 ppt.

Models 5 and 6: Low = ≤ 46 ppq; Medium = >46-128 ppq; High = >128 ppq.

Table A-2-8.
Interaction Table for Serum Insulin (mIU/ml) (Nondiabetics)
(Continuous)
Occupation and Body Fat Removed from Final Model

a) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY — ADJUSTED (Dioxin Category-by-Age: Table A-2-7)					
Stratum	Dioxin Category	n	Adjusted Mean ^a	Difference of Adjusted Mean vs. Comparisons (95% C.I.) ^b	p-Value ^c
Born ≥ 1942	Comparison	467	57.54		
	Background RH	133	48.26	-9.28 --	0.023
	Low RH	80	57.00	-0.54 --	0.921
	High RH	136	62.35	4.81 --	0.294
	Low plus High RH	216	60.31	2.77 --	0.465
Born < 1942	Comparison	547	70.50		
	Background RH	221	69.28	-1.22 --	0.781
	Low RH	124	71.71	1.21 --	0.826
	High RH	80	85.08	14.58 --	0.045
	Low plus High RH	204	76.68	6.18 --	0.192

^a Transformed from natural logarithm scale.

^b Difference of means after transformation to original scale; confidence interval on difference of means not presented because analysis was performed on natural logarithm scale.

^c P-value is based on difference of means on natural logarithm scale.

Note: RH = Ranch Hand.

Model 3: Comparison: Current Dioxin ≤ 10 ppt.

Background (Ranch Hand): Current Dioxin ≤ 10 ppt.

Low (Ranch Hand): Current Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 143 ppt.

High (Ranch Hand): Current Dioxin > 10 ppt, Initial Dioxin > 143 ppt.